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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
TORRES, JOSEPH D	

ART UNIT	PAPER NUMBER
2133	

DATE MAILED: 11/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/087,130	BRUNER ET AL.	
	Examiner	Art Unit	
	Joseph D. Torres	2133	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 August 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13,15-26 and 28-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *15-26* is/are allowed.

6)☒ Claim(s) *1-13 and 28-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 November 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 08/08/2006 have been fully considered but they are not persuasive. However; the Examiner reopens prosecution to fully address all of the Applicant's arguments in the Pre-Brief Conference request filed 08/08/2006. Since the Examiner does not change any of the current grounds of rejection for claims 1-13, 28 and 29, the finality of the current action is appropriate. Claim 30 was amended in the Applicant's response filed 03/08/2006; hence finality of the current action is appropriate.

The Applicant states the following two concerns: 1) failure to address arguments on pages 11-18 of the Applicant's response filed 07/10/2006, 2) motivation for combining the arts in the rejection of claims 1 and 28-30 and 3) prima facie case for rejecting claim 29.

As per the Applicant's contention that the Examiner has failed to address the Applicant's arguments filed 07/10/2006 concerning claim 1.

The Applicant contends that Ott and Makansi fail to teach the limitation of "a circuit connected to the digital data channel which can characterizes the stored input data and the retrieve output data in at least two alternative digital configurations" in claim 1.

The Examiner begins by showing that all of the limitations in claim 1 are taught by the Ott and Makansi combination and, in particular, the limitation, "a circuit connected to

the digital data channel which can characterizes the stored input data and the retrieve output data in at least two alternative digital configurations" since this is the limitation that the Applicant contends is not taught in the Ott and Makansi combination. Figure 1 of Makanski teaches three encoders 7a-7c (analogous to the three encoders 102-104 in Figure 1 of Ott) disposed to transmit data to a storage channel 3 in Figure 1 of Makanski (analogous to the transmission channel 113 in Figure 1 of Ott) and three decoders 9a to 9c in Figure 1 of Makanski disposed to decode data encoded using encoders 7a-7c in Figure 1 of Makanski (analogous to Decoders 110-112 in Figure 1 of Ott used for decoding data encoded using encoders 102-104 in Figure 1 of Ott).

Col. 2, lines 63-68 in Makanski teaches that each of the encoders 7a-7c provides a different code at a different coding rate, which Makanski defines as the number of input data bits to the number of encoded bits. Encoders with different coding rates have different digital configurations the digital configurations defined by the different encoding rules for the codes. Makanski explicitly teaches a storage access circuitry in Figure 1 of Makanski connected to the digital data storage channel channel 3 in Figure 1 of Makanski which can characterizes the stored input data and the retrieve output data in at least two alternative digital configurations defined by the coding rules for a particular coding rate. Note: Makanski explicitly teaches encoders 7a-7c in Figure 1 of Makanski for characterizing stored input data in at least two alternative digital configurations defined by the coding rate of the encoder whereas decoders 9a to 9c in Figure 1 of Makanski characterize retrieved output data in at least two alternative digital configurations defined by the coding rate of the decoder.

The Examiner asserts that every single detail, in the Applicant's claim 1, is taught by the Ott and Makansi combination.

Motivation for combining:

The Examiner asserts that the factual inquiries set forth in Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103 are are summarized as follows:

(A) Determine the scope and content of a patent claim relative to a claim in the application at issue;

(B) Determine the differences between the scope and content of the patent claim as determined in (A) and the claim in the application at issue;

(C) Determine the level of ordinary skill in the pertinent art; and

(D) Evaluate any objective indicia of nonobviousness.

(A) Determine the scope and content of a patent claim relative to a claim in the application at issue:

Figure 1 of Ott teaches three encoders 102-104 characterizing data in at least two alternative digital configurations disposed to transmit data to in a transmission channel 113 in Figure 1 of Ott and three decoders Decoders 110-112 also characterizing data in at least two alternative digital configurations in Figure 1 of Ott disposed to decode data encoded using encoders 102-104 in Figure 1 of Ott.

(B) Determine the differences between the scope and content of the patent claim as determined in (A) and the claim in the application at issue:

The Applicant's claim 1 provides substantially same means for characterizing data as in the Ott patent, however; the transmission channel in Ott is replaced with a storage channel in the Applicant's claim 1.

(C) Determine the level of ordinary skill in the pertinent art:

MPEP 2141.03 recites, ""The importance of resolving the level of ordinary skill in the art lies in the necessity of maintaining objectivity in the obviousness inquiry." Ryko Mfg. Co. v. Nu-Star, Inc., 950 F.2d 714, 718, 21 USPQ2d 1053, 1057 (Fed. Cir. 1991). The examiner must ascertain what would have been obvious to one of ordinary skill in the art at the time the invention was made, and not to the inventor, a judge, a layman, those skilled in remote arts, or to geniuses in the art at hand. Environmental Designs, Ltd. v. Union Oil Co., 713 F.2d 693, 218 USPQ 865 (Fed. Cir. 1983), cert. denied, 464 U.S. 1043 (1984)".

The Question boils down to what is the level of ordinary skill in the pertinent art for recognizing that the error correction system taught in the Ott patent for use on a transmission channel is applicable to any transmission channel including storage channels. The Examiner asserts that all transmission channels, including storage channels, suffer from periodic noise and degradation and that an Engineer should not only consider any means for decreasing the effect of noise and degradation, but would be negligent by ignoring any means for decreasing the effect of noise and degradation.

The Examiner asserts that Ott provides an error correction means for that an engineer cannot ignore when considering the effect of noise and degradation on transmission channel including storage channels.

(D) Evaluate any objective indicia of nonobviousness:

Col. 2, lines 52-63 in Ott explicitly provide motivation for using the error correction system taught in Ott on any transmission channel that suffers from the effect of noise and degradation including storage channels. Ott teaches that the error correction system allows for increased bandwidth when channel degradation is low and the use of more robust error correction when channel degradation is high.

The Examiner asserts that Figure 1 of Makanski teaches three encoders 7a-7c (analogous to the three encoders 102-104 in Figure 1 of Ott) disposed to transmit data to a storage channel 3 in Figure 1 of Makanski (analogous to the transmission channel 113 in Figure 1 of Ott) and three decoders 9a to 9c in Figure 1 of Makanski disposed to decode data encoded using encoders 7a-7c in Figure 1 of Makanski (analogous to Decoders 110-112 in Figure 1 of Ott used for decoding data encoded using encoders 102-104 in Figure 1 of Ott).

One of ordinary skill in the art at the time the invention was made would have been highly motivated to combine Makanski with Ott to deal with changes in storage channel degradation over time.

Note: it can easily be seen in Figuere 1 of Ott and Figure 1 of Makanski that stored input data in a storage channel as recited in claim 1 (and as taught in Makanski) corresponds to transmitted data in the transmission channel of Figure 1 of Ott and retrieved output data in a storage channel as recited in claim 1 (and as taught in Makanski) corresponds to received data from the transmission channel of Figure 1 of Ott.

As per the Applicant's contention that the Examiner has failed to address the Applicant's arguments filed 07/10/2006 concerning claim 28.

The Applicant contends that Ott and Makansi fail to teach the limitation of "means for predicting error rate performance in relation to a selected digital data configuration of a plurality of different digital data configurations for both the same input data and the same output data." in claim 28. The Abstract in the Ott patent explicitly teaches a signal quality/error rate detector for predicting error rate at a particular time for a selected digital data configuration determined by a particular coding rate used by Decoders 110-112 in Figure 1 of Ott.

As per the Applicant's contention that the Examiner has failed to address the Applicant's arguments filed 07/10/2006 concerning claim 29.

Ott teaches a circuit for predicting error rate performance (the Abstract in the Ott patent explicitly teaches a signal quality/error rate detector for predicting error rate at a particular time for a selected digital data configuration determined by a particular coding

rate used by Decoders 110-112 in Figure 1 of Ott; Note; as pointed out, above, in Bold underline, stored data in Makanski corresponds to transmitted data in the Transmission Channel 113 of Ott and retrieved data corresponds to received data). Ott teaches a circuit configured for comparing stored data with retrieved data after characterizing both the stored data and the retrieved data in a selected digital configuration from a plurality of different selectable digital configurations (col. 7, lines 15-20 in Ott teaches comparing transmitted checksum data, i.e. the checksum stored in a transmitted packet, with a calculated checksum, i.e., retrieved checksum data based on transmitted data stored in a transmitted packet; Note: comparing transmitted checksum data R to recalculated checksum data R' is equivalent to comparing transmitted data [D, R] to received and recalculated Data [D, R'] since the difference [D, R] - [D, R']; Note also the RS codes require the same error detection steps as CRC codes prior to correction errors). Makanski explicitly teaches a storage access circuitry in Figure 1 of Makanski connected to the digital data storage channel channel 3 in Figure 1 of Makanski which can characterizes the stored input data and the retrieve output data in at least two alternative digital configurations defined by the coding rules for a particular coding rate. Note: Makanski explicitly teaches encoders 7a-7c in Figure 1 of Makanski for characterizing stored input data in at least two alternative digital configurations defined by the coding rate of the encoder whereas decoders 9a to 9c in Figure 1 of Makanski characterize retrieved output data in at least two alternative digital configurations defined by the coding rate of the decoder. Ott and Makanski teach a circuit for predicting error rate performance (the Abstract in the Ott patent) associated with storing

data and retrieving the stored data (Note; as pointed out, above, in Bold underline, stored data in Storage channel 3 in Figure 1 of Makanski corresponds to transmitted data in the Transmission Channel 113 of Ott and retrieved data in Makanski corresponds to received data in Ott), the circuit configured for comparing stored data with retrieved data (. 7, lines 15-20 in Ott teaches comparing transmitted checksum data, i.e. the checksum stored in a transmitted packet, with a calculated checksum, i.e., retrieved checksum data based on transmitted data stored in a transmitted packet) after characterizing both the stored data and the retrieved data in a selected digital configuration from a plurality of different selectable digital configurations (Makanski explicitly teaches encoders 7a-7c in Figure 1 of Makanski for characterizing stored input data in at least two alternative digital configurations defined by the coding rate of the encoder whereas decoders 9a to 9c in Figure 1 of Makanski characterize retrieved output data in at least two alternative digital configurations defined by the coding rate of the decoder.

As per the Applicant's contention that the Examiner has failed to address the Applicant's arguments filed 07/10/2006 concerning claim 30.

Since claim 30 was amended in the Applicant's response filed 03/08/2006; the Examiner provides the rejection for claim 30, below.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 28 and 29 is rejected under 35 U.S.C. 112, second paragraph, as failing to set forth the subject matter which applicant(s) regard as their invention.

Claim 29 is written as a preamble with no body (proper indentation is required). Note: preambles are not normally give patentable weight.

Claim 28 recites, "predicting error rate performance in relation to a selected digital data configuration of a plurality of different digital data configurations for both the same input data and the same output data", which is confusing and indefinite. The Examiner assumes the Applicant intended"--predicting error rate performance in relation to a selected digital data configuration of a plurality of different digital data configurations for both the same input data corresponding to the same output data--.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1, 4-6, 11 and 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ott; Stefan (US 6182264 B1) in view of Makansi; Tarek et al. (US 4804959 A, hereafter referred to as Makansi).

35 U.S.C. 103(a) rejection of claim 1.

Ott teaches a digital data transmission channel 113 for transmitting input data through a physical data channel medium and subsequently receives transmitted output data from the physical data channel medium made from the input data (Figure 1 in Ott teaches a digital data transmission channel 100 which transmits input data 101 to a data channel transmission medium 113 and subsequently receives transmitted output data from the medium 113 made from the input data 101; Note: a transmission channel generally includes a multitude of digital-to-analogue D/A converters, modulators, demodulators, A/D converters etc. to support transmission through he physical channel); and a circuit connected to the digital data channel which can characterize the transmitted input data and the retrieved output data in at least two alternative digital configurations (See circuits 102, 103, 104, 110, 111 and 112 in Figure 1 which characterize transmitted input data and the retrieved output data in at least two alternative digital configurations, CRC, RS or RS+ARQ) and predict error rate performance in relation to a first of the alternative digital configurations for both the input data and output data and, alternatively, to a second of the alternative digital configurations for both the input data and output data (Sterp 306 in Figure 3 of Ott teaches error rate performance in relation

to a first of the alternative digital configurations for both the input data and output data and, alternatively, to a second of the alternative digital configurations for both the input data and output data). Note: the same digital data configuration for the input is also used for the corresponding output for the input.

However Ott does not explicitly teach the specific use of a digital data channel, which stores input data to a data storage medium.

Makansi, in an analogous art, teaches use of a digital data channel, which stores input data to a data storage medium (Figure 4 in Anderson). The Examiner asserts that Figure 1 in Ott teaches an adaptive decoding device for a transmission channel and Makansi teaches an analogous adaptive decoding device for a storage medium designed to maintain an error rate at an acceptable error rate level using adaptive RLL codes to provide immunity to ISI noise. One of ordinary skill in the art at the time the invention was made would have known that storage media suffer from a variety of noise issues just as any other channel medium and would benefit from error correction as taught in both Ott and Makansi.

The Examiner asserts that the factual inquiries set forth in Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103 are are summarized as follows:

(A) Determine the scope and content of a patent claim relative to a claim in the application at issue;

(B) Determine the differences between the scope and content of the patent claim as determined in (A) and the claim in the application at issue;

(C) Determine the level of ordinary skill in the pertinent art; and

(D) Evaluate any objective indicia of nonobviousness.

(A) Determine the scope and content of a patent claim relative to a claim in the application at issue:

Figure 1 of Ott teaches three encoders 102-104 characterizing data in at least two alternative digital configurations disposed to transmit data to in a transmission channel 113 in Figure 1 of Ott and three decoders Decoders 110-112 also characterizing data in at least two alternative digital configurations in Figure 1 of Ott disposed to decode data encoded using encoders 102-104 in Figure 1 of Ott.

(B) Determine the differences between the scope and content of the patent claim as determined in (A) and the claim in the application at issue:

The Applicant's claim 1 provides substantially same means for characterizing data as in the Ott patent, however; the transmission channel in Ott is replaced with a storage channel in the Applicant's claim 1.

(C) Determine the level of ordinary skill in the pertinent art:

MPEP 2141.03 recites, ""The importance of resolving the level of ordinary skill in the art lies in the necessity of maintaining objectivity in the obviousness inquiry." Ryko Mfg. Co. v. Nu-Star, Inc., 950 F.2d 714, 718, 21 USPQ2d 1053, 1057 (Fed. Cir. 1991). The examiner must ascertain what would have been obvious to one of ordinary skill in the art at the time the invention was made, and not to the inventor, a judge, a layman, those skilled in remote arts, or to geniuses in the art at hand. Environmental Designs, Ltd. v.

Union Oil Co., 713 F.2d 693, 218 USPQ 865 (Fed. Cir. 1983), cert. denied, 464 U.S. 1043 (1984)".

The Question boils down to what is the level of ordinary skill in the pertinent art for recognizing that the error correction system taught in the Ott patent for use on a transmission channel is applicable to any transmission channel including storage channels. The Examiner asserts that all transmission channels, including storage channels, suffer from periodic noise and degradation and that an Engineer should not only consider any means for decreasing the effect of noise and degradation, but would be negligent by ignoring any means for decreasing the effect of noise and degradation. The Examiner asserts that Ott provides an error correction means for that an engineer cannot ignore when considering the effect of noise and degradation on transmission channel including storage channels.

(D) Evaluate any objective indicia of nonobviousness:

Col. 2, lines 52-63 in Ott explicitly provide motivation for using the error correction system taught in Ott on any transmission channel that suffers from the effect of noise and degradation including storage channels. Ott teaches that the error correction system allows for increased bandwidth when channel degradation is low and the use of more robust error correction when channel degradation is high.

The Examiner asserts that Figure 1 of Makanski teaches three encoders 7a-7c (analogous to the three encoders 102-104 in Figure 1 of Ott) disposed to transmit data to a storage channel 3 in Figure 1 of Makanski (analogous to the transmission channel 113 in Figure 1 of Ott) and three decoders 9a to 9c in Figure 1 of Makanski disposed to

decode data encoded using encoders 7a-7c in Figure 1 of Makanski (analogous to Decoders 110-112 in Figure 1 of Ott used for decoding data encoded using encoders 102-104 in Figure 1 of Ott).

One of ordinary skill in the art at the time the invention was made would have been highly motivated to combine Makanski with Ott to deal with changes in storage channel degradation over time.

Note: it can easily be seen in Figuere 1 of Ott and Figure 1 of Makanski that stored input data in a storage channel as recited in claim 1 (and as taught in Makanski) corresponds to transmitted data in the transmission channel of Figure 1 of Ott and retrieved output data in a storage channel as recited in claim 1 (and as taught in Makanski) corresponds to received data from the transmission channel of Figure 1 of Ott.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Ott with the teachings of Makansi by including use of a digital data channel, which stores input data to a data storage medium. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of a digital data channel, which stores input data to a data storage medium would have provided adaptive error correction capabilities to a storage based on error rate requirements at a given time as taught in the Ott patent.

35 U.S.C. 103(a) rejection of claim 4.

Steps 302-306 in Figure 3 of Ott.

35 U.S.C. 103(a) rejection of claim 5.

Makansi teaches the circuit performs run length limited (RLL) encoding upon the input data prior to characterizing the input data (Encoders 7a-7c in Figure 1 of Makansi perform RLL encoding prior to the Encoder Seelct circuit 8 characterizing encoding requirements for input data), and wherein the circuit further inhibits RLL decoding of the output data to reflect said RLL encoding (Decoder Select 10 in Figure 1 of Makansi substantially inhibits non-selected RLL decoders from being used in future processes to reflect said RLL encoding).

35 U.S.C. 103(a) rejection of claim 6.

Encoding in Figure 1 of Ott is selected in accordance with error correction capabilities of a given error correction code given a particular acceptable error rate, that is, the error correction code must be able to correct a given number of errors in a time interval to achieve a particular acceptable error rate.

35 U.S.C. 103(a) rejection of claim 11.

The Abstract and Figure 1 of Makansi teaches separate encoders and decoders for characterizing the input and output data in at least two alternative run length limited RLL digital code configurations.

35 U.S.C. 103(a) rejection of claim 28.

The Abstract in the Ott patent explicitly teaches a signal quality/error rate detector for predicting error rate at a particular time for a selected digital data configuration determined by a particular coding rate used by Decoders 110-112 in Figure 1 of Ott. However Ott does not explicitly teach the specific use of a digital data channel, which stores input data to a data storage medium.

Makansi, in an analogous art, teaches use of a digital data channel, which stores input data to a data storage medium (Figure 4 in Anderson). The Examiner asserts that Figure 1 in Ott teaches an adaptive decoding device for a transmission channel and Makansi teaches an analogous adaptive decoding device for a storage medium designed to maintain an error rate at an acceptable error rate level using adaptive RLL codes to provide immunity to ISI noise. One of ordinary skill in the art at the time the invention was made would have known that storage media suffer from a variety of noise issues just as any other channel medium and would benefit from error correction as taught in both Ott and Makansi.

The Examiner asserts that the factual inquiries set forth in Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103 are are summarized as follows:

(A) Determine the scope and content of a patent claim relative to a claim in the application at issue;

(B) Determine the differences between the scope and content of the patent claim as determined in (A) and the claim in the application at issue;

(C) Determine the level of ordinary skill in the pertinent art; and

(D) Evaluate any objective indicia of nonobviousness.

(A) Determine the scope and content of a patent claim relative to a claim in the application at issue:

Figure 1 of Ott teaches three encoders 102-104 characterizing data in at least two alternative digital configurations disposed to transmit data to in a transmission channel 113 in Figure 1 of Ott and three decoders Decoders 110-112 also characterizing data in at least two alternative digital configurations in Figure 1 of Ott disposed to decode data encoded using encoders 102-104 in Figure 1 of Ott.

(B) Determine the differences between the scope and content of the patent claim as determined in (A) and the claim in the application at issue:

The Applicant's claim 1 provides substantially same means for characterizing data as in the Ott patent, however; the transmission channel in Ott is replaced with a storage channel in the Applicant's claim 1.

(C) Determine the level of ordinary skill in the pertinent art:

MPEP 2141.03 recites, ""The importance of resolving the level of ordinary skill in the art lies in the necessity of maintaining objectivity in the obviousness inquiry." Ryko Mfg. Co. v. Nu-Star, Inc., 950 F.2d 714, 718, 21 USPQ2d 1053, 1057 (Fed. Cir. 1991). The examiner must ascertain what would have been obvious to one of ordinary skill in the art at the time the invention was made, and not to the inventor, a judge, a layman, those skilled in remote arts, or to geniuses in the art at hand. Environmental Designs, Ltd. v.

Union Oil Co., 713 F.2d 693, 218 USPQ 865 (Fed. Cir. 1983), cert. denied, 464 U.S. 1043 (1984)".

The Question boils down to what is the level of ordinary skill in the pertinent art for recognizing that the error correction system taught in the Ott patent for use on a transmission channel is applicable to any transmission channel including storage channels. The Examiner asserts that all transmission channels, including storage channels, suffer from periodic noise and degradation and that an Engineer should not only consider any means for decreasing the effect of noise and degradation, but would be negligent by ignoring any means for decreasing the effect of noise and degradation. The Examiner asserts that Ott provides an error correction means for that an engineer cannot ignore when considering the effect of noise and degradation on transmission channel including storage channels.

(D) Evaluate any objective indicia of nonobviousness:

Col. 2, lines 52-63 in Ott explicitly provide motivation for using the error correction system taught in Ott on any transmission channel that suffers from the effect of noise and degradation including storage channels. Ott teaches that the error correction system allows for increased bandwidth when channel degradation is low and the use of more robust error correction when channel degradation is high.

The Examiner asserts that Figure 1 of Makanski teaches three encoders 7a-7c (analogous to the three encoders 102-104 in Figure 1 of Ott) disposed to transmit data to a storage channel 3 in Figure 1 of Makanski (analogous to the transmission channel 113 in Figure 1 of Ott) and three decoders 9a to 9c in Figure 1 of Makanski disposed to

decode data encoded using encoders 7a-7c in Figure 1 of Makanski (analogous to Decoders 110-112 in Figure 1 of Ott used for decoding data encoded using encoders 102-104 in Figure 1 of Ott).

One of ordinary skill in the art at the time the invention was made would have been highly motivated to combine Makanski with Ott to deal with changes in storage channel degradation over time.

Note: it can easily be seen in Figuere 1 of Ott and Figure 1 of Makanski that stored input data in a storage channel as recited in claim 1 (and as taught in Makanski) corresponds to transmitted data in the transmission channel of Figure 1 of Ott and retrieved output data in a storage channel as recited in claim 1 (and as taught in Makanski) corresponds to received data from the transmission channel of Figure 1 of Ott.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Ott with the teachings of Makansi by including use of a digital data channel, which stores input data to a data storage medium. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of a digital data channel, which stores input data to a data storage medium would have provided adaptive error correction capabilities to a storage based on error rate requirements at a given time as taught in the Ott patent.

35 U.S.C. 103(a) rejection of claims 29 and 30.

Ott teaches a circuit for predicting error rate performance (the Abstract in the Ott patent explicitly teaches a signal quality/error rate detector for predicting error rate at a particular time for a selected digital data configuration determined by a particular coding rate used by Decoders 110-112 in Figure 1 of Ott). Ott teaches a circuit configured for comparing stored data with retrieved data after characterizing both the stored data and the retrieved data in a selected digital configuration from a plurality of different selectable digital configurations (col. 7, lines 15-20 in Ott teaches comparing transmitted checksum data, i.e. the checksum stored in a transmitted packet, with a calculated checksum, i.e., retrieved checksum data based on transmitted data stored in a transmitted packet; Note: comparing transmitted checksum data R to recalculated checksum data R' is equivalent to comparing transmitted data [D, R] to received and recalculated Data [D, R'] since the difference [D, R] - [D, R']; Note also the RS codes require the same error detection steps as CRC codes prior to correction errors).

In addition Ott teaches encoders 102-104 in Figure 1 of Ott for characterizing transmitted channel data in at least two alternative digital configurations defined by the coding rate of the encoder whereas decoders 110-112 in Figure 1 of Ott characterize received output data from transmission channel 113 in at least two alternative digital configurations defined by the coding rate of the decoder.

However Ott does not explicitly teach the specific use of a digital data channel, which stores input data to a data storage medium.

Makansi, in an analogous art, teaches use of a digital data channel, which stores input data to a data storage medium (Figure 4 in Anderson). The Examiner asserts that

Figure 1 in Ott teaches an adaptive decoding device for a transmission channel and Makansi teaches an analogous adaptive decoding device for a storage medium designed to maintain an error rate at an acceptable error rate level using adaptive RLL codes to provide immunity to ISI noise. One of ordinary skill in the art at the time the invention was made would have known that storage media suffer from a variety of noise issues just as any other channel medium and would benefit from error correction as taught in both Ott and Makansi.

The Examiner asserts that the factual inquiries set forth in Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103 are are summarized as follows:

(A) Determine the scope and content of a patent claim relative to a claim in the application at issue;

(B) Determine the differences between the scope and content of the patent claim as determined in (A) and the claim in the application at issue;

(C) Determine the level of ordinary skill in the pertinent art; and

(D) Evaluate any objective indicia of nonobviousness.

(A) Determine the scope and content of a patent claim relative to a claim in the application at issue:

Figure 1 of Ott teaches three encoders 102-104 characterizing data in at least two alternative digital configurations disposed to transmit data to in a transmission channel 113 in Figure 1 of Ott and three decoders Decoders 110-112 also characterizing data in

at least two alternative digital configurations in Figure 1 of Ott disposed to decode data encoded using encoders 102-104 in Figure 1 of Ott.

(B) Determine the differences between the scope and content of the patent claim as determined in (A) and the claim in the application at issue:

The Applicant's claim 1 provides substantially same means for characterizing data as in the Ott patent, however; the transmission channel in Ott is replaced with a storage channel in the Applicant's claim 1.

(C) Determine the level of ordinary skill in the pertinent art:

MPEP 2141.03 recites, ""The importance of resolving the level of ordinary skill in the art lies in the necessity of maintaining objectivity in the obviousness inquiry." Ryko Mfg. Co. v. Nu-Star, Inc., 950 F.2d 714, 718, 21 USPQ2d 1053, 1057 (Fed. Cir. 1991). The examiner must ascertain what would have been obvious to one of ordinary skill in the art at the time the invention was made, and not to the inventor, a judge, a layman, those skilled in remote arts, or to geniuses in the art at hand. Environmental Designs, Ltd. v. Union Oil Co., 713 F.2d 693, 218 USPQ 865 (Fed. Cir. 1983), cert. denied, 464 U.S. 1043 (1984)".

The Question boils down to what is the level of ordinary skill in the pertinent art for recognizing that the error correction system taught in the Ott patent for use on a transmission channel is applicable to any transmission channel including storage channels. The Examiner asserts that all transmission channels, including storage channels, suffer from periodic noise and degradation and that an Engineer should not only consider any means for decreasing the effect of noise and degradation, but would

be negligent by ignoring any means for decreasing the effect of noise and degradation. The Examiner asserts that Ott provides an error correction means for that an engineer cannot ignore when considering the effect of noise and degradation on transmission channel including storage channels.

(D) Evaluate any objective indicia of nonobviousness:

Col. 2, lines 52-63 in Ott explicitly provide motivation for using the error correction system taught in Ott on any transmission channel that suffers from the effect of noise and degradation including storage channels. Ott teaches that the error correction system allows for increased bandwidth when channel degradation is low and the use of more robust error correction when channel degradation is high.

The Examiner asserts that Figure 1 of Makanski teaches three encoders 7a-7c (analogous to the three encoders 102-104 in Figure 1 of Ott) disposed to transmit data to a storage channel 3 in Figure 1 of Makanski (analogous to the transmission channel 113 in Figure 1 of Ott) and three decoders 9a to 9c in Figure 1 of Makanski disposed to decode data encoded using encoders 7a-7c in Figure 1 of Makanski (analogous to Decoders 110-112 in Figure 1 of Ott used for decoding data encoded using encoders 102-104 in Figure 1 of Ott).

One of ordinary skill in the art at the time the invention was made would have been highly motivated to combine Makanski with Ott to deal with changes in storage channel degradation over time.

Note: it can easily be seen in Figuere 1 of Ott and Figure 1 of Makanski that stored input data in a storage channel as recited in claim 1 (and as taught in

Makanski) corresponds to transmitted data in the transmission channel of Figure 1 of Ott and retrieved output data in a storage channel as recited in claim 1 (and as taught in Makanski) corresponds to received data from the transmission channel of Figure 1 of Ott.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Ott with the teachings of Makansi by including use of a digital data channel, which stores input data to a data storage medium. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of a digital data channel, which stores input data to a data storage medium would have provided adaptive error correction capabilities to a storage based on error rate requirements at a given time as taught in the Ott patent.

4. Claims 2, 3 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable Ott; Stefan (US 6182264 B1) and Makansi; Tarek et al. (US 4804959 A, hereafter referred to as Makansi) in view of Franaszek, Peter A. (US 3689899 A).

35 U.S.C. 103(a) rejection of claim 2.

Ott and Makansi substantially teaches the claimed invention described in claims 1 and 15 (as rejected above). In addition, the Examiner asserts that once a digital configuration is selected in Figure 2 of Ott it remains the same during a single transmission hence the received and transmitted symbol lengths are the same. If CRC

coder 102 in Figure 1 of Ott is a first coder for a first digital configuration then RS coder 103 in Figure 1 of Ott is a second coder.

However Ott and Makansi do not explicitly teach the specific use of multi-bit symbols.

Franaszek, in an analogous art, teaches use of multi-bit symbols (see Abstract in Franaszek; Note: an RLL codeword is a multi-bit symbol).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Ott and Makansi with the teachings of Franaszek by including use of multi-bit symbols. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of multi-bit symbols would have provided a desired coding efficiency achieved without unduly complicating the design of the encoding and decoding apparatus if the encoded information is handled in the form of variable-length symbol words rather than fixed-length symbol words (see col. 1, lines 31-37 in Franaszek).

35 U.S.C. 103(a) rejection of claim 3.

The Abstract in Franaszek teaches variable length multibit codeword symbols.

35 U.S.C. 103(a) rejection of claim 12.

Figure 1B in Franaszek teaches a shift register for arranging variable length codeword symbols. Shift register components are state machines.

5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ott; Stefan (US 6182264 B1) and Makansi; Tarek et al. (US 4804959 A, hereafter referred to as Makansi) in view of Reed; David E. et al. (US 6115198 A, hereafter referred to as Reed).

35 U.S.C. 103(a) rejection of claim 7.

Ott and Makansi substantially teaches the claimed invention described in claim 1 and 15 (as rejected above).

However Ott and Makansi does not explicitly teach the specific use of interleaving.

Reed, in an analogous art, teaches use of interleaving (see Interleaver 100 in Figure 9A of Schachner).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Ott and Makansi with the teachings of Reed by including use of interleaving. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of interleaving would have provided the opportunity to effectively decode RLL encoded data.

6. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ott; Stefan (US 6182264 B1) and Makansi; Tarek et al. (US 4804959 A, hereafter referred to as Makansi) in view of Schachner; Joseph M. et al. (US 6442730 B1, hereafter referred to as Schachner).

35 U.S.C. 103(a) rejection of claim 8.

Ott and Makansi substantially teaches the claimed invention described in claim 1 and 15 (as rejected above). In addition, Makansi teaches the circuit performs run length limited (RLL) encoding upon the input data prior to characterizing the input data (Encoders 7a-7c in Figure 1 of Makansi perform RLL encoding prior to the Encoder Seelct circuit 8 characterizing encoding requirements for input data), and wherein the circuit further inhibits RLL decoding of the output data to reflect said RLL encoding (Decoder Select 10 in Figure 1 of Makansi substantially inhibits non-selected RLL decoders from being used in future processes to reflect said RLL encoding).

However McNeil and Makansi do not explicitly teach the specific use of emulation. Schachner, in an analogous art, teaches use of emulation (see Abstract in Schachner). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Ott and Makansi with the teachings of Schachner by including use of emulation. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of emulation would have provided more accurately determine if errors exist in the signal (col. 4, lines 56-62 in Schachner).

7. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable Ott; Stefan (US 6182264 B1), Makansi; Tarek et al. (US 4804959 A, hereafter referred to as

Makansi) and Franaszek, Peter A. (US 3689899 A) in view of McNeil; Michael et al. (US 5995305 A, hereafter referred to as McNeil).

35 U.S.C. 103(a) rejection of claim 9.

Ott, Makansi and Franaszek substantially teaches the claimed invention described in claims 1 and 2 (as rejected above).

However Ott, Makansi and Franaszek do not explicitly teach the specific use of predicting error rate performance by comparing the input sequence and the output sequence.

McNeil, in an analogous art, teaches predicting error rate performance by comparing the input sequence and the output sequence (Col. 14, lines 18-32 in McNeil teaches that Soft Error Rate Comparator Circuit 108 in Figure 6 for predicting error rate performance by comparing the input sequence and the output sequence).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Ott, Makansi and Franaszek with the teachings of McNeil by including use of predicting error rate performance by comparing the input sequence and the output sequence. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of predicting error rate performance by comparing the input sequence and the output sequence would have provided a means for calculating raw error rate as required in the Ott patent.

35 U.S.C. 103(a) rejection of claim 10.

The Abstract and Figure 1 of Makansi teaches separate encoders and decoders for characterizing the input and output data in at least two alternative run length limited RLL digital code configurations.

8. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable Ott; Stefan (US 6182264 B1), Makansi; Tarek et al. (US 4804959 A, hereafter referred to as Makansi) and Franaszek, Peter A. (US 3689899 A) in view of Lee; Patrick J. (US 6405342 B1).

35 U.S.C. 103(a) rejection of claim 13.

Ott, Makansi and Franaszek substantially teaches the claimed invention described in claims 1, 2 and 12 (as rejected above).

However Ott, Makansi and Franaszek do not explicitly teach the specific use of determining an uncorrectable number of erroneous symbols in each interleave that exceed a correctable number of erroneous symbols that can be detected by a first ECC encoding methodology.

Lee, in an analogous art, teaches use of determining an uncorrectable number of erroneous symbols in each interleave that exceed a correctable number of erroneous symbols that can be detected by a first ECC encoding methodology (col. 9, lines 6-10, Lee).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Ott, Makansi and Franaszek with the teachings of Lee by including use of determining an uncorrectable number of erroneous symbols in each interleave that exceed a correctable number of erroneous symbols that can be detected by a first ECC encoding methodology. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of determining an uncorrectable number of erroneous symbols in each interleave that exceed a correctable number of erroneous symbols that can be detected by a first ECC encoding methodology would have provided an indicator for retry operations based on uncorrectable error level (col. 9, lines 6-28, Lee).

Allowable Subject Matter

9. Claims 15-26 are allowed.

Conclusion

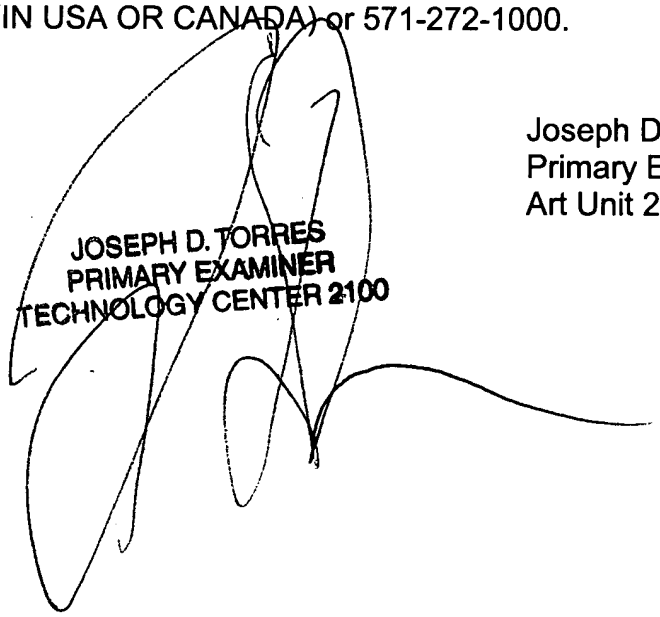
10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph D. Torres whose telephone number is (571) 272-3829. The examiner can normally be reached on M-F 8-5.
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on (571) 272-3819. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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